The Association Between Obesity and Social Anxiety Disorder

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ABSTRACT

Background

Obesity has been gradually increasing since 1980, it has been shown to have a variety of causes and impacts. Those who are obese are more likely to suffer from several diseases such as cancers and diabetes.

Correlations have been found between psychiatric disorders and obesity, yet specific disorders such as social anxiety disorder lack research.

This review looks at the relationship between obesity and social anxiety disorder, discusses why the association exists and provides recommendations.

Results

As BMI increases so does the likelihood of suffering from Social Anxiety disorder in the United States and Canada in females in both lifetime and past year prevalence, no association was found for males. No association found in New Zealand.

Severely obese adolescents found to have higher rates of social anxiety disorder compared with healthy controls. Obese female adolescents correlation found, no correlation for males. Obese female adolescents have more intense social anxiety than male adolescents.

White Caucasians stronger association than African Americans.

Relationship with eating disorders may exist.

Research from Germany provided conflicting results.

In the Netherlands, no association between social anxiety disorder and weight gain/loss over two years.
**Conclusion**

Association found with obesity and social stigma possibly resulting in social anxiety disorder with females being affected more. Evidence suggests social the stigma of obese adolescents results in social anxiety disorder lasting well-into adulthood along with their obesity.

**Recommendations**

Consider social stigmas impact on the obese population particularly in under 18s when planning interventions as it may result in social anxiety disorder which could be a barrier to the treatment of obesity.

Therapist assisted internet cognitive behavioural therapy is recommended for social anxiety disorder; if psychotropic medicine is used, Bupropion is recommended.

Research recommendations included.

**Keywords**: Social Anxiety Disorder, Social Phobia, Association, Overweight, Obesity, Body Mass Index, BMI

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**LIST OF ABBREVIATIONS AND ACRONYMS**


**DSM-5** – Diagnostic and Statistical Manual of Mental Disorders, 5th Edition. **DSM-4** – Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. **Odds Ratio (OR)** – The odds that an outcome will occur given an exposure (Szumilas, 2010).

**Confidence Interval (CI)** – All CI’s cited in the paper are 95%, the true value is somewhere between the upper and lower confidence limit. **SAD** – Social Anxiety Disorder. **FNE** – Fear of negative evaluation. **SAD-New** – Social avoidance and distress in new, unfamiliar situations. **SAD-General** – Social avoidance and distress in many situations. **CBT** – Cognitive behavioural therapy. **SSRI** - Selective Serotonin Reuptake Inhibitors.
Globally obesity has gradually increased from 1980 to 2015 (GBD 2015 Obesity Collaborators, 2017). Obesity amongst adults in the United States increased from 33.7% in 2007-2008 to 39.6% in 2015-2016, with severe obese adults making up 5.7% in 2007-2008 to 7.7% in 2015-2016. Women are more likely to be obese (41.1%) than men (37.9%) and they are more likely to be severely obese (9.7%) than men (5.6%) in 2015-2016 (Hales et al, 2018).

Obesity’s risk factors include; excess caloric intake (depends on weight, sex, age, height and activity level), genetics and medical conditions such as polycystic ovary syndrome (Bouchard, 2010; Choquet & Meyre, 2011; Hall et al, 2011; Joham et al, 2016; Saeed et al, 2018). Other risk factors include maternal exposure to dichlorodiphenyldichloroethylene, smoking and use of childcare resulting in an increased likelihood of the child becoming obese (Geoffroy et al, 2013; Banderali et al, 2015; Liu & Peterson, 2015). Many sociodemographic variables have been linked to obesity such as income, population density, education, age and marital status (Husky et al, 2018).

Obesity increases the likelihood of diseases including cardiovascular disease, diabetes, chronic kidney disease, cancers and musculoskeletal disorders (GBD 2015 Obesity Collaborators, 2017). Other issues include: increased likelihood of stillbirth and miscarriage, increased social stigma possibly resulting in SAD (Hilbert et al, 2008; Puhl & Heuer, 2009; Chou et al, 2011; Felisbino-Mendes et al, 2014; Stein et al, 2014).

**Social Anxiety Disorder**

SAD is potentially caused by a range of biopsychosocial factors interacting with each other such as genetics, negative social events (such as bullying) and overprotective parenting (Lieb et al, 2000; Tillfors, 2004; Hettema et al, 2005; Erwin et al, 2006; National Collaborating Centre for Mental Health, 2013).

Impacts of SAD include; reduced educational achievement, fewer friends, less likely to marry, to have children and more likely to divorce. Sufferers of SAD may be less likely to complete tasks such as going to a shop, gym and presentations. The
economic cost of SAD has been found to be; lower employment rates, less household income, increased rate of state benefits (2.5x vs general population) and increased healthcare cost (£609 annually – in the UK) (National Collaborating Centre for Mental Health, 2013).

**SCOPE**

**Obesity & Mental Health**

Associations exist between psychiatric disorders and obesity (Britz et al, 2000; Petry et al, 2008; Scott et al, 2008a). Links with anxiety disorders have been found, particularly in women and those with low education (Petry et al, 2008; Scott et al, 2008a; Scott et al, 2008b; Gariepy et al, 2010; Dreber et al, 2017).

Anxiety disorders are the most prevalent psychiatric disorder and are more common in women with different rates across different countries (Bandelow & Michaelis, 2015). The 12-month prevalence of SAD in the United States has been found to be approximately 7%, Europe approximately 2.3% (American Psychiatric Association, 2013). SAD has been found to have comorbidity with other psychiatric disorders such as substance disorders, other anxiety disorders (except OCD), mood disorders and impulse control disorders (Kessler et al, 2005; Schneier et al, 2010).

This is the first literature review looking at the association between social anxiety disorder and obesity.

The association between SAD and Obesity has been found to have confounding variables including race (Caucasians significantly higher positive correlation than African Americans) and age (positive correlation between ages 6-12; 13-17 year olds less clear) (Thompson et al, 2013).

Obesity is caused by a wide range of factors, to defeat obesity a wide range of coordinated interventions must be developed. This requires individuals, communities, schools, healthcare providers, governments and industry working together to defeat the range of causes and impacts of obesity (Malik et al, 2013).

Social anxiety disorder may be a risk factor for developing obesity and/or a barrier to the treatment of obesity and/or SAD. Obesity may be a risk factor for developing
SAD possibly resulting in a barrier to the treatment of SAD and/or obesity. The causality may go one way or both ways.

RESEARCH QUESTION AND OBJECTIVES

Research Question
What is the association between obesity and social anxiety disorder?

Objectives
- Identify the association if any between obesity and social anxiety disorder.
- Examine possible causes of associations found.
- Provide recommendations on how to reduce this association.
### CRITERIA OF SOCIAL ANXIETY DISORDER UNDER DSM IV/V (300.23 (F40.10))

<table>
<thead>
<tr>
<th>Criteria</th>
<th>DSM-4</th>
<th>DSM-5</th>
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<tbody>
<tr>
<td>A.</td>
<td>A marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. The individual fears that he or she will act in a way that will be humiliating or embarrassing.</td>
<td>Marked fear or anxiety about one or more social situations in which the individual is exposed to possible scrutiny by others.</td>
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<tr>
<td>B.</td>
<td>Exposure to the feared social situation almost invariably provokes anxiety, which may take the form of a situationally bound or situationally predisposed Panic Attack.</td>
<td>The individual fears that he or she will act in a way or show anxiety symptoms that will be negatively evaluated</td>
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<td>C.</td>
<td>The person recognizes that the fear is excessive or unreasonable.</td>
<td>The social situations almost always provoke fear or anxiety.</td>
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<td>D.</td>
<td>The feared social or performance situations are avoided or else are endured with intense anxiety or distress.</td>
<td>The social situations are avoided or endured with intense fear or anxiety.</td>
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<tr>
<td>E.</td>
<td>The avoidance, anxious anticipation, or distress in the feared social or performance situation(s) interferes significantly with the person’s normal routine, occupational (academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.</td>
<td>The fear or anxiety is out of proportion to the actual threat posed by the social situation and to the sociocultural context.</td>
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<tr>
<td>F.</td>
<td>In individuals under age 18 years, the duration is at least 6 months.</td>
<td>The fear, anxiety, or avoidance is persistent, typically lasting for 6 months or more.</td>
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<tr>
<td>G.</td>
<td>The fear or avoidance is not due to the direct physiological effects of a substance or a general medical condition and is not better accounted for by another mental disorder</td>
<td>The fear, anxiety, or avoidance causes clinically significant distress or impairment in</td>
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<td>social, occupational or other important areas of functioning</td>
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<tr>
<td>H.</td>
<td>If a general medical condition or another mental disorder is present, the fear in Criterion A is unrelated to it</td>
<td>The fear, anxiety, or avoidance is not attributable to the physiological effects of a substance or another medical condition</td>
</tr>
<tr>
<td>I.</td>
<td>N/A</td>
<td>The fear, anxiety, or avoidance is not better explained by the symptoms of another mental disorder</td>
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<tr>
<td>J.</td>
<td>N/A</td>
<td>If another medical condition (e.g. obesity) is present, the fear, anxiety, or avoidance is clearly unrelated or is excessive</td>
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</table>

Key changes in the definitions are highlighted in bold.

Previously those diagnosed using DSM-5 (i.e. obese patients who wouldn’t be diagnosed under DSM-4) criteria closely resembled DSM-4 SAD patients rather than those without disorders and showed greater levels of social anxiety such as impairments in social life and distress about the anxiety (Dalrymple et al, 2011; Dalrymple et al, 2017).

Those who identify obesity as the reason behind their social anxiety can be diagnosed under DSM-5. Papers which use the DSM-4 definition will be failing to diagnose those who identify their obesity as the reason of their social anxiety. This could result in correlations between obesity and SAD to be weaker.

**LITERATURE SEARCH STRATEGY**

Search engines used include; EUPubMed, PubMed (US), ScienceDirect, Psychiatry Online, Ovid, Google Scholar, MetSearch (and any database it links to) and all literature sources publicly available. The ease of access to online articles reduces the time required to search through papers.

Online databases may not search the whole article, only the title and the abstract (due to the possibility that they may not have access to the full article), it is therefore required to search keywords which may be associated with what is being researched (An example is, Psychiatric Disorders rather than SAD).

Keywords will include different versions of the same word, e.g. obesity, obese, BMI 30+ etc.
### Keywords related to Social Anxiety Disorder

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>Social Phobia</td>
<td>Alternative word to Social Anxiety Disorder which is commonly used. It is included in the DSM-4/5 (American Psychiatric Association, 1994; American Psychiatric Association, 2013).</td>
</tr>
<tr>
<td>Psychiatric Disorders / Psychiatric Disorders</td>
<td>Social Anxiety Disorder is a Psychiatric Disorder. Many studies will look at a range of Psychiatric Disorders and will use the words ‘Psychiatric Disorders’ in the title instead of each individual disorder they studied.</td>
</tr>
<tr>
<td>Anxiety Disorders / Anxiety</td>
<td>Social Anxiety Disorder is an Anxiety Disorder; a study may use the words ‘Anxiety Disorders’ in the title instead of each individual anxiety disorder studied.</td>
</tr>
<tr>
<td>Mental Health</td>
<td>Papers may use the words ‘Mental Health’ instead of ‘Psychiatric Disorders’.</td>
</tr>
<tr>
<td>DSM-V / DSM - 5 / Diagnostic and Statistical Manual of Mental Disorders, 5th Edition</td>
<td>The criteria of DSM-5 is preferred. The significant criteria change from DSM-4 to DSM-5 impacts the results of the studies in relation to obesity.</td>
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</tbody>
</table>

### Keywords related to Obesity

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>Obesity</td>
<td>Half of the research topic. Same word as used by healthcare professionals &amp; researchers.</td>
</tr>
<tr>
<td>Overweight</td>
<td>Associated with obesity. Those who are overweight may become obese in the future.</td>
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<tr>
<td>Weight Gain</td>
<td>Weight gain is associated with obesity. Weight gain can result in becoming obese.</td>
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<tr>
<td>BMI/Body Mass Index</td>
<td>Some papers may define their papers by BMI rather than obesity/overweight.</td>
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### Inclusion Criteria

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<thead>
<tr>
<th>Criteria</th>
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<tr>
<td>DSM-5 Definition Preferred. DSM 5/4 definition used.</td>
<td>The DSM-V definition is the latest definition of Social Anxiety Disorder and diagnoses Social Anxiety if it is a result of a medical condition (e.g. obesity). Papers using DSM 5/4 definition will be used to ensure correct diagnosis and consistency across the literature review. DSM 5 papers will be highlighted.</td>
</tr>
<tr>
<td>Correct definition of Obesity/BMI used</td>
<td>Correct definitions used for Obesity/BMI makes the study reviewed useful for the review and future practice.</td>
</tr>
<tr>
<td>Peer Reviewed Journal Articles</td>
<td>Peer reviewed journal articles only to ensure that the paper is of sufficient quality.</td>
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</table>

### Exclusion Criteria

<table>
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<tr>
<th>Criteria</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>Not using DSM 5/4 definition</td>
<td>Not using the DSM to define Social Anxiety Disorder would result in the review being inconsistent which would make the review incorrect. Failure to use the correct definition would make the results of the review false.</td>
</tr>
<tr>
<td>Incorrect definition of BMI/Obesity</td>
<td>Not using the correct definition of BMI/Obesity would result in the review being inconsistent which would make the review incorrect. Failure to use the correct definition would make the results of the review false.</td>
</tr>
<tr>
<td>Studies funded by interest groups</td>
<td>Studies which have been funded by interest groups such as; fat pride/acceptance, ‘health at every size’ etc. The results and/or design of the study may have been made to match an agenda, e.g. increased funding for a mental health or to reduce stigma of overweight/obese people etc.</td>
</tr>
</tbody>
</table>
Correlation between Social Anxiety Disorder and Obesity

Papers reviewed used the DSM-4 criteria; no DSM-5 papers were found.

In Berchtesgaden, Germany 29.8% of adolescents aged 15-21 years old with extreme obesity were found to have suffered from SAD at some point in their lives compared with healthy weight controls of 3.4%. Another 8.5% of patients were found to have suffered from social anxiety, yet could not be diagnosed as they identified their obesity as the reason behind their social anxiety.

In Germany obese patients undertaking weight loss treatment were more likely to suffer from SAD compared with controls at the time of the interview (Herpertz et al, 2006). However, the lifetime prevalence of SAD of severely obese candidates seeking weight loss surgery in 2007 within a single surgical practice was found to be 9.4% compared with national data in 2007 of 12.1% (Harvard Medical School, 2007; Kalarchian et al, 2007).

The National Epidemiologic Survey on Alcohol and Related Conditions done in the US in 2001-2002 found an increasing risk of having been diagnosed with SAD in their lifetime when the patient is obese, this was increased when the patient was severely obese. The same was found for past year prevalence except the ORs were higher for each increase in BMI; severely obese lifetime OR was 1.84 compared with past year prevalence of 2.26. (Petry et al, 2008).

In New Zealand a national face-to-face household survey with 12,992 participants aged 16+ was undertaken. The participants were split into two groups: BMI 18.5-29.9 (healthy & overweight) compared to BMI 30+ (Obese), the OR was 1.24 (1.00-1.54 95% CI) among those with BMI 30+ compared to BMI 18.5-29.9, therefore no difference was found (Scott et al, 2008b).

In Canada on a nationally representative sample it was found that lifetime SAD was linked with obesity when compared with non-obese participants (1.18 OR, 1.01-1.38 CI). Past year was not statistically significant (1.28 OR, 0.99-1.66 CI) (Mather et al, 2009).
Another study found that the level of Social Anxiety was not associated with BMI. It was found to be not significantly higher in severely obese participants compared to obese and overweight participants (Ostrovsky et al, 2013).

In Italy a higher prevalence of SAD in severely obese patients was observed before and after bariatric surgery compared with healthy controls (Mirijello et al, 2015).

In the Netherlands a longitudinal study found no association between SAD and weight gain/loss over two years (De Wit et al, 2015).

**Gender**

In Berchtesgaden, Germany it was found that 29.4% of severely obese adolescent males had suffered from SAD compared with 30% of females. When looking at the obese group it was found that 10% of females were suffering from SAD; no test was done for males. The healthy weight group for females was 4.6% and for males 2% (Britz et al, 2000).

In Germany the prevalence of lifetime diagnosis of SAD in patients undertaking weight loss treatment differed to the controls; healthy-weight women had a lifetime prevalence of 2.4% compared with 2.2% of obese patients, obese patients undergoing conventional treatment (4.9%) and obesity surgery (7.8%). Point prevalence rates were: healthy weight (0.8%), obese (1.1%), conventional treatment (2.7%) and obesity surgery (7.8%). Males had a lifetime prevalence of; healthy controls (2.1%), obese controls (2.8%), conventional treatment (5.9%) and obesity surgery (2%). Point prevalence rates for men were: healthy controls (0%), obese controls (2.8%), conventional treatment (0%), obesity surgery (2%) (Herpertz et al, 2006).

Obese men in Germany were found to have a statistically significant OR of 2.46 (1.14-5.30 CI) of a ‘Fear of feeling ashamed’ when compared with non-obese men, there was no difference found for women (Hach et al, 2007).

The National Epidemiologic Survey on Alcohol and Related Conditions done in the US in 2001-2002 found that females are more likely to be diagnosed as having SAD in the overweight category compared with the healthy weight category in both
lifetime (1.27 OR) and past year prevalence (1.37 OR), this however was not displayed in males. Obese females were more likely to suffer from SAD than overweight females in lifetime (1.70 OR) and past year prevalence (1.81 OR), males showed no difference between healthy and obese weight categories (Barry et al, 2008).

In Canada it was demonstrated that no difference existed between non-obese and obese men for lifetime SAD (OR 1.11, CI 0.84-1.45). Women had statically significant results (OR 1.34, CI 1.11-1.61). Past year prevalence was found to be statistically insignificant in men (OR 1.41, CI 0.85-2.33), but in women it was found to be statistically significant (OR 1.39, CI 1.08-1.80) (Mather et al, 2009).

In the US following up 3 years from the National Epidemiologic Survey on Alcohol and Related Conditions once the ORs were adjusted there was no difference between sex or healthy/overweight/obese categories diagnosed with SAD (Pickering et al, 2011).

Rising BMI and social appearance anxiety may be related in women diagnosed with an eating disorder (Claes et al, 2012).

Obese youth in a treatment clinic were demonstrated to have differences between males and females when looking at specific areas of Social Anxiety. Adolescent girls were found to have a greater FNE and SAD-New than boys; no difference found for SAD-General. In elementary ages girls have higher levels of SAD-General than boys (Thompson et al, 2013).

In US female undergraduate students as BMI increased so did appearance-based social anxiety. General social anxiety was not found to be related to BMI (Titchener & Wong, 2014).
DISCUSSION

All the papers found were DSM-4. Correlation between SAD and obesity may be reduced as described in ‘Criteria of social anxiety disorder under DSM IV/V (300.23(F0.10))’.

Methods of data collection

Internet surveys allow researchers to reach individuals whom would not otherwise take part in the study (Wright, 2005). One of the barriers to the treatment of SAD is the psychological burden of entering treatment (e.g. entering a hospital to see a psychiatrist, fear of negative evaluation from people seeing them enter the hospital etc), because of this, studies which are face-to-face or require a questionnaire submission in person rather than on the internet may miss out on potential sufferers of SAD (Olfson et al, 2000). Over 80% of person(s) suffering from SAD do not receive treatment, yet 50% for those with generalised anxiety disorder do despite the symptoms of SAD being recognized by approximately 80% of individuals and for generalised anxiety disorder it was less than 50% (Coles et al, 2009). This suggests that SAD is a barrier to its own treatment, therefore they will be unlikely to want to take part in studies, therefore they will not be identified and as a result any association between SAD and obesity would be reduced (Grant et al, 2005).

Using an internet-based survey removes the requirement for social interaction as it is not face-to-face, it can be done anonymously (e.g. create a fake email, home address etc) and reduces social-desirability bias due to the lack of an interviewer (Heerwegh, 2009; Zhang et al, 2017). The sample may be limited (e.g. those who use computers, specific websites, on certain mailing lists, self-selection bias etc) (Wright, 2005). In the case of the Ostrovsky study, no personal identifying information was collected and participants could enter a $50 gift raffle for participation; there may be multiple submissions by the same person (i.e. create multiple emails, enter result multiple times) to attempt to win the raffle (Ostrovsky et al, 2013).
Online research is more likely to include university educated and more knowledgeable participants than face-to-face studies (Duffy et al, 2005; Szolnoki et al, 2013). Those with lower levels of education are more likely to be obese and suffer from SAD (Fehm et al, 2001; Cohen et al, 2013; Yu, 2016). Therefore, online studies will be more likely to display lower levels of SAD and obesity than face-to-face studies; studies must control for educational level.

Ostrovsky et al, 2013 was an internet-based survey but did not control for educational level. The study consisted of mostly white and highly educated females and found no association between SAD and BMI; perhaps education reduces the likelihood of suffering from SAD as BMI rises in females (Fehm et al, 2001; Cohen et al, 2013; Yu, 2016).

Having an interviewer can result in additional information which would not be included in an internet-based survey. In the case of Britz et al, the interviewers felt that the severe obesity contributed to the interviewees social anxiety (Britz et al, 2000).

**Social Stigma Towards Obese and Overweight People**

Young children may have negative perceptions of overweight peers (Su et al, 2012; Spiel et al, 2012). Perhaps due to the negative portrayal of overweight/obese person(s) in the media (Klein & Shiffman, 2005; Klein & Shiffman, 2006; Robinson et al, 2008; Throop et al, 2014). Elementary aged children are less likely to help overweight peers in the classroom and overweight children are more likely to be bullied (Lumeng et al, 2010; Patel et al, 2012). In middle and high school overweight/obese adolescents are more socially isolated, with obese/overweight girls being more effected than boys (Flakner et al, 2001; Strauss & Pollack, 2003). Overweight/obese adolescents may encounter more bullying, appearance-based teasing, more upset by teasing and encounter it more frequently than their healthy weight peers; they may have a higher preference for sedentary activities and a lower preference for active and social activities (Hayden-Wade et al, 2005; Griffiths et al, 2006). Adolescents and teachers have reported being overweight as a primary cause of adolescents being targeted for abuse (Puhl et al, 2011; Bradshaw et al, 2013).
Children who are bullied and/or mistreated are more likely to suffer from poor mental health throughout their childhood and adult life (Swearer et al, 2001; Lereya et al, 2015). Victimized adolescents were two to three times more likely to suffer from an anxiety disorder in adulthood than non-victimized adolescents (Stapinski et al, 2014). SAD was significantly (92% of SAD participants) linked with a history of teasing, this is compared with obsessive compulsive disorder (50%) and panic disorder (35%) (McCabe et al, 2003).

In Spain girls scored higher on social anxiety symptoms than boys, but the association between bullying victimization and social anxiety was stronger for boys (Cavet et al, 2016). In China there was a positive correlation between bullying and SAD which was stronger in girls than in boys (Wu et al, 2018).

Increased social stigma suffered by overweight/obese adolescents may explain the findings by Britz et al, 2000, Herpertz et al, 2006 and Thompson et al, 2013 of increased rates and severity of SAD in overweight and obese adolescents compared to healthy weight adolescents with female adolescents experiencing it more than males. The increased social isolation of obese girls compared with obese boys may explain the findings of girls having greater FNE and SAD-New (Thompson et al, 2013).

The increased social isolation of obese and overweight girls and increased severity of symptoms compared with obese and overweight boys may explain why obese and overweight adult females have been found to be more likely to suffer from SAD when compared with their healthy counter parts, yet men are not (Swearer et al, 2001; McCabe et al, 2003; Barry et al, 2008; Mather et al, 2009; Stapinski et al, 2014; Lereya et al, 2015; Wu et al, 2018). The median age of onset of SAD is 13 years old; first onset in adulthood is rare, suggesting social isolation of obese and overweight adolescents may cause SAD well into adulthood (American Psychiatric Association, 2013). Childhood BMI levels have been found to correlate strongly with values measured in adulthood, suggesting that once a child is overweight/obese, they are unlikely to change in adulthood (Juhola et al, 2011).

Stigma towards overweight and obese people has been found in adult populations as well (Hilbert et al, 2008; Puhl & Heuer, 2009; Stein et al, 2014). Possibly due to weight bias in the media (Puhl & Heuer, 2009; Ata & Thompson, 2010; Heuer et al,
This may result in social isolation which increases the likelihood of suffering from SAD (Chou et al, 2011). Increased stigma can result in a high level of stress which can contribute to a reduction in the ability to effectively communicate and an increased risk of developing an anxiety disorder such as SAD (Phelan et al, 2015).

Obese people seeking medical treatment perceive and suffer from provider discrimination; such as nurses, physicians and healthcare students; patients have increased feelings of embarrassment and shame in reporting health problems; this can result in patients cancelling appointments (Flint, 2015; Phelan et al, 2015; Fruh et al, 2016). Women are more likely to report suffering from weight discrimination than men (Puhl et a, 2008; Hatzenbuehler et al, 2009). This may explain the stronger correlation between BMI and SAD in women; due to increased discrimination treatment seeking would be reduced more so than overweight and obese men, resulting in SAD and/or obesity being less likely to be treated.

As SAD is potentially a barrier to its own treatment and the perceived stigma suffered by obese patients is a barrier to treatment, it is possible to use therapist supported internet CBT to treat SAD as the fear of negative social evaluation is reduced significantly as the patient does not have to attend a hospital/practice. Other benefits include: increase in cost-effectiveness, time-effectiveness, time flexibility and high availability; therapist-supported internet CBT has been found to be equally as effective as face-to-face CBT; therapist-supported CBT and unguided CBT may not be significantly different in outcomes (Olfson et al, 2000; Grant et al, 2005; Coles et al, 2009; El Alaoui et al, 2015; Mathiasen et al, 2016; Olthuis et al, 2016; Lau et al, 2017). Treating SAD via internet CBT may reduce the barrier of SAD to the treatment of obesity, therefore obesity in patients may be reduced once SAD has been reduced.

Psychologists have been found to describe obese patients as having more severe symptoms and a worse prognosis than healthy weight patients (Pont et al, 2017). This may explain the correlation between BMI and SAD.

Hach et al, 2007’s research in Germany found opposing research possibly due to a difference in culture to the US/Canada. Populations in the US, Canada and Germany have been found to have negative attitudes towards overweight and obese people, thus reducing the likelihood of reduced social stigma in Germany towards obese
people explaining the different findings of Hach et al, 2007 (Puhl & Heuer, 2009; Stein et al, 2014). The findings of Hach et al, 2007 cannot be further explained without further research.

Pickering et al, 2011 in the US suggested no difference between sex and weight categories; this used data from the National Epidemiologic Survey on Alcohol and Related Conditions follow up survey; Barry et al, 2008 used data from the first National Epidemiologic Survey on Alcohol and Related Conditions but found an association between overweight and obesity in females. Pickering et al, 2011 found no association when Barry et al, 2008 did, it may be due to Pickering et al, 2011 adjusting the ORs for considerably more potential confounding variables than Barry et al, 2008 did (Barry et al, 2008; Pickering et al, 2011).

**Selective Serotonin Reuptake Inhibitors as a potential cause for the correlation between Obesity and Social Anxiety Disorder**

Psychotropic drugs such as selective serotonin reuptake inhibitors (SSRIs) can be used as treatment for SAD which can induce weight-gain; this was heavily influenced by age and unhealthy lifestyle factors (poor diet and sedentary activity) (Shi et al, 2017). Although, Bupropion has been associated with weight loss in non-smokers, whereas smokers gained weight (Afterburn et al, 2016). Nortriptyline has been associated with weight loss, although current studies are only short-term and Afterburn et al, 2016 was a long-term study which may provide more accurate long-term insights into SSRI usage and weight gain (Blumenthal et al, 2014). Bupropion appears to be a preferred drug treatment for overweight and obese patients for treating SAD (Emmanuel et al, 2000; Hasnain & Vieweg, 2013).

When psychotropic medication was controlled for by De Wit et al, 2015 there was no association found between diagnosis of SAD and weight gain/loss (De Wit et al, 2015).
LIMITATIONS

The researcher had a lack of knowledge of psychiatric disorders and obesity prior to this research. Possibly many keywords were missed out, papers misunderstood and papers failed to be included due to what journals Cardiff Metropolitan University had access to.

CONCLUSIONS

As BMI increases so does the likelihood of females suffering from Social Anxiety disorder in the United States and Canada in both lifetime and past year prevalence. Association between obesity and SAD found in extremely obese adolescents and obese females, but not obese males; obese female adolescents found to have more intense social anxiety than male adolescents. White Caucasians had a stronger association than African Americans in one study.

A relationship with eating disorders may exist.

Research from Germany provided conflicting results.

Research in the Netherlands found no association between SAD and weight gain/loss over two years. It can be suggested that the weight gain does not occur after the diagnosis of SAD, but instead that SAD followed weight gain, most likely in adolescents due to social stigma. This likely carried into adulthood resulting in the correlations seen in this study.

The development of SAD may be a barrier to the treatment of obesity.
RECOMMENDATIONS

In attempting to reduce obesity in the population that social stigma around obesity, particularly in obese under 18 females is considered as it may result in SAD which may be a barrier to treatment (such as going to the doctor, dietitian, gym, etc).

When attempting to cure SAD and therefore reduce the barrier to treatment it is recommended to use therapist assisted internet CBT.

If internet CBT is unavailable, the use of Bupropion is recommended over other psychotropic medicines in treating SAD due to the weight-loss effects observed.

It is recommended to research more into the association of obesity and SAD, including the impacts of age, gender, race, social stigma, eating disorders and differences between countries (e.g. US and Germany). Finding out if SAD is a barrier to the treatment of obesity would have significant impacts in practice.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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